

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

RHAPTOTHYREUS TYPICUS N.G., N.SP., AN ABYSSAL
MARINE NEMATODE REPRESENTING A NEW
FAMILY OF UNCERTAIN TAXONOMIC POSITION

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Several unusual male and juvenile specimens of a new species of abyssal, marine nematode have been collected near the Pacific coast of Colombia and Chile, off the southwest coast of South Africa, and off the east coast of Florida by the Lamont Geophysical Laboratory; and on the Atlantic slope near the coast of New Jersey, and at several stations near Bermuda by the Woods Hole Oceanographic Institute.

These nematodes are striking in that they possess an exceptionally large, oval amphid with a median longitudinal rib, a vestigial stoma and esophagus, no apparent gut, and a single spiculum. Notwithstanding their wide geographic separation, the specimens from all of these stations have no morphological differences judged to be interspecific.

Females may also be present in the same collections but, if so, they are not recognizable because of pronounced sexual dimorphism. Examination of the juveniles revealed no clues to the identity of females.

The greatest abundance of specimens from a single locality was found off the coast of New Jersey, and it is upon this population that the following description is based.

All but two specimens were prepared as permanent whole-mounts in glycerine; the remaining two were embedded in polyethylene glycol, sectioned at 5 μ , and stained with hematoxylin by the method of Craig and Wilson (1937).

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RHAPTOTHYREIDAE NEW FAMILY

Diagnosis: Rather large nematodes. Cuticle smooth but with very fine transverse striations observed in some regions. Somatic papillae very small and sparse. Amphid oval, 2 to 3 head diameters long, with median longitudinal rib and transverse rows of punctations. Stoma and esophagus vestigial, gut apparently absent. Spiculum single and gubernaculum absent. Taxonomic position uncertain.

Rhaptothyreus new genus

Diagnosis: Same as that of the family. The name *Rhaptothyreus* is descriptive of the amphid and is derived from the Greek *rhaptos*, meaning stitched or sewn, and *thyreos*, meaning a large, oblong, door-shaped shield.

Rhaptothyreus typicus new species

Specimens: 18 males; 2 juveniles.

Measurements of males:

Holotype: L = 9.80 mm; a = 87.4; b = 33.0; c = 133.0.

Paratypes: L = 6.99–12.80 (8.79 ± 1.26) mm.

a = 67.2–98.8 (78.9 ± 6.9).

b = 26.5–44.4 (32.7 ± 4.0).

c = 100.6–152.0 (122.2 ± 14.1).

Description: Body slender and gradually tapered anteriorly; posteriorly tapered, curving mostly on dorsal side, from near level of cloaca

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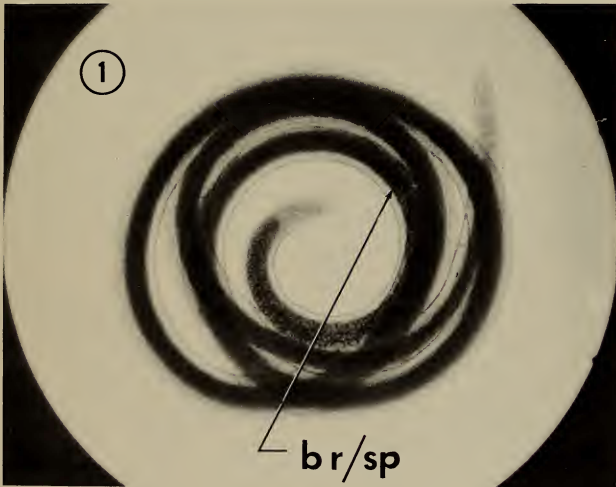
FIG. 1. *Rhaptothyreus typicus* n. sp. Wholemout of paratype showing the general features of the body including the junction between the posterior end of the zone containing basophilic rods and the anterior end of the solid cylinder of granular cells (br/sp). × 52.

FIG. 2. *Rhaptothyreus typicus* n. sp. A portion of an amphid of the holotype depicting the transverse rows of punctations and the longitudinal rib (lr). × 1,440.

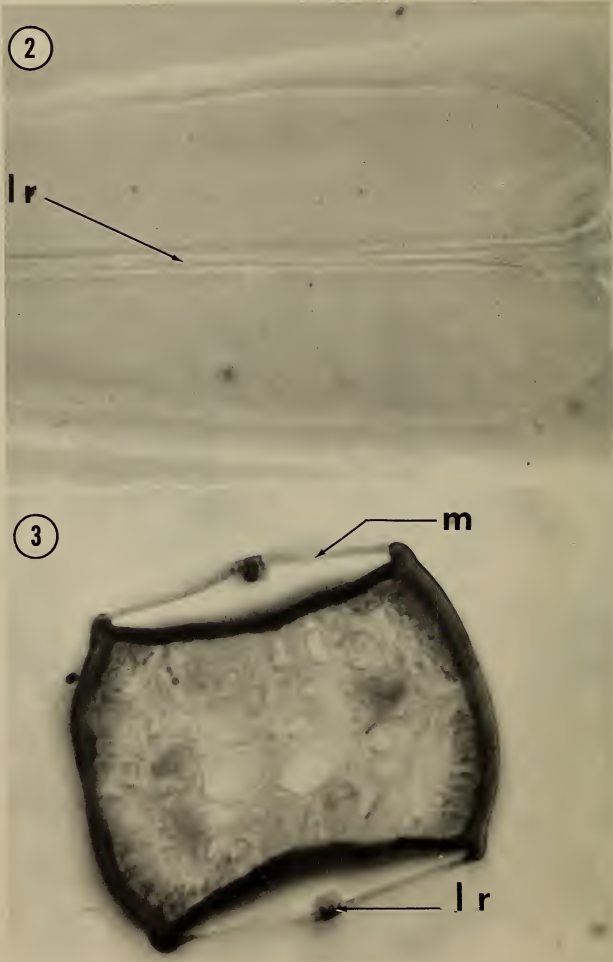
FIG. 3. *Rhaptothyreus typicus* n. sp. Transverse section of a paratype cut at the level of the amphids showing the external layer of cuticle on the amphid (m) and its longitudinal rib (lr). × 1,440.

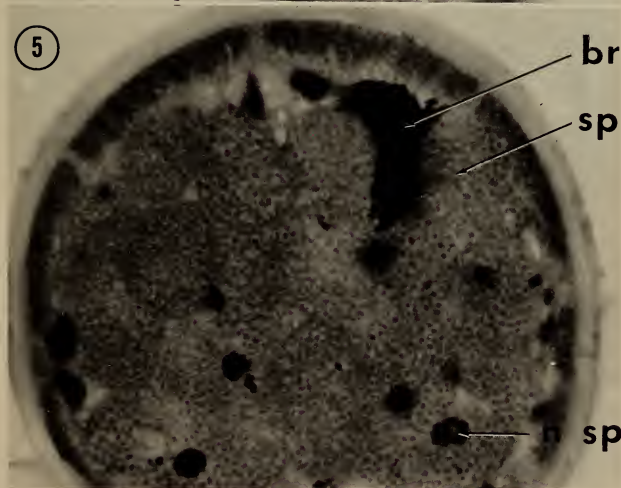
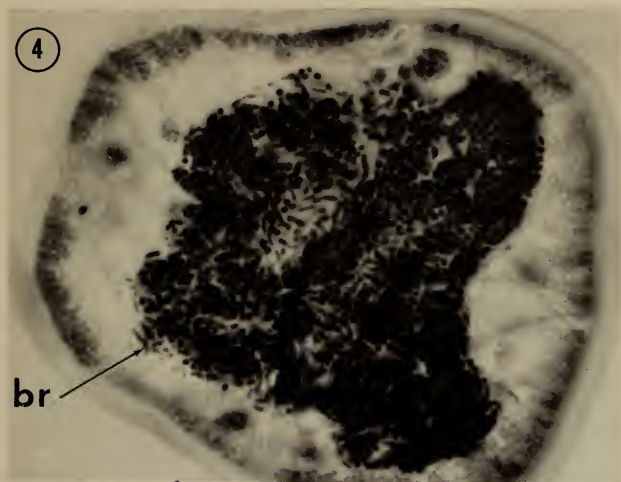
FIG. 4. *Rhaptothyreus typicus* n. sp. Transverse section of a paratype showing the basophilic rods (br). Note the apparent absence of intestinal cells. × 1,440.

FIG. 5. *Rhaptothyreus typicus* n. sp. Transverse sections of a paratype cut at a level slightly posterior to the junction between the region containing the basophilic rods and the cylinder of cells. The body cavity is largely occupied by the cells of the cylinder (sp), but a small area is occupied by a dense mass of rods (br). Nuclei of the cells constituting the cylinder (n sp). × 1,440.



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(Fig. 1). Head diameter at level of cephalic setae $33.0\text{ }\mu\text{--}42.0\text{ }\mu$ ($37.3\text{ }\mu \pm 2.3\text{ }\mu$). Body diameter at posterior margin of amphid $60.5\text{ }\mu\text{--}76.0\text{ }\mu$ ($67.7\text{ }\mu \pm 5.0\text{ }\mu$); at base of esophagus $76.5\text{ }\mu\text{--}102.1\text{ }\mu$ ($86.6\text{ }\mu \pm 6.1\text{ }\mu$); at mid-body length $90.5\text{ }\mu\text{--}133.7\text{ }\mu$ ($111.3\text{ }\mu \pm 11.1\text{ }\mu$); and at level of cloaca $57.5\text{ }\mu\text{--}80.0\text{ }\mu$ ($67.4\text{ }\mu \pm 6.5\text{ }\mu$). Cuticle without longitudinal striations, but with extremely fine transverse striae, most evident on neck and tail of male and produced by fine transverse ridges and furrows on inner surface of cuticle; periodicity of striae $1\text{ }\mu\text{--}2\text{ }\mu$ (Figs. 7 and 9).

Twelve cephalic setae, each slightly longer than wide (Figs. 7 and 8). Cervical setae also very short and arranged in eight longitudinal rows at level of amphid; one row at dorsal and one at ventral margins of each amphid and two subdorsal and two subventral rows (Fig. 7). Somatic setae equally short, but sparse and not in obvious rows.

Distance from anterior extremity of head to anterior margin of amphid $19.0\text{ }\mu\text{--}30.5\text{ }\mu$ ($25.3\text{ }\mu \pm 3.0\text{ }\mu$). Amphid a large, oval intracuticular cavity $83.0\text{ }\mu\text{--}102.0\text{ }\mu$ ($93.0\text{ }\mu \pm 6.0\text{ }\mu$) long, $31.0\text{ }\mu\text{--}40.0\text{ }\mu$ ($34.9\text{ }\mu \pm 2.8\text{ }\mu$) wide (Fig. 7). External wall of cavity a thin, external layer of cuticle bearing closely spaced, transverse rows of punctations and a longitudinal, tubular rib on medial surface of membrane (Figs. 2, 3, and 7). Lumen of rib partially divided by discontinuous, longitudinal keel (Figs. 2 and 3). Posterior approximately $\frac{2}{3}$ of tube with well-developed, continuous keel and two distinct lumina. At posterior end of amphid, each lumen proceeds medially into hypodermal tissue.

Head rounded, without lips or microlabia* (Figs. 7 and 8). Vestige of stoma shifted slightly dorsad (Figs. 7 and 8). Neck laterally compressed in region of amphid (Figs. 3 and 8). Nerve ring $152.0\text{ }\mu\text{--}193.7\text{ }\mu$ ($171.6\text{ }\mu \pm 11.0\text{ }\mu$) from anterior extremity of head. Ventral gland absent. Esophagus not well-formed, but represented by diffuse, amorphous tissue devoid of a lumen (Fig. 3); gut apparently absent. Body cavity largely occupied by dense aggregations of basophilic, rod-shaped particles approximately

* See Hope, 1967, for definition.

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FIG. 6. *Rhaptothyreus typicus* n. sp. Transverse section of a male paratype cut at the level of the spiculum (s). $\times 1,875$.

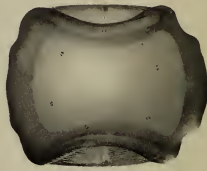
FIG. 7. *Rhaptothyreus typicus* n. sp. Lateral view of the head of the holotype.

FIG. 8. *Rhaptothyreus typicus* n. sp. Face view of a paratype.

FIG. 9. *Rhaptothyreus typicus* n. sp. Lateral view of the tail of the holotype.

FIG. 10. *Rhaptothyreus typicus* n. sp. Lateral view of the tail of a juvenile paratype.

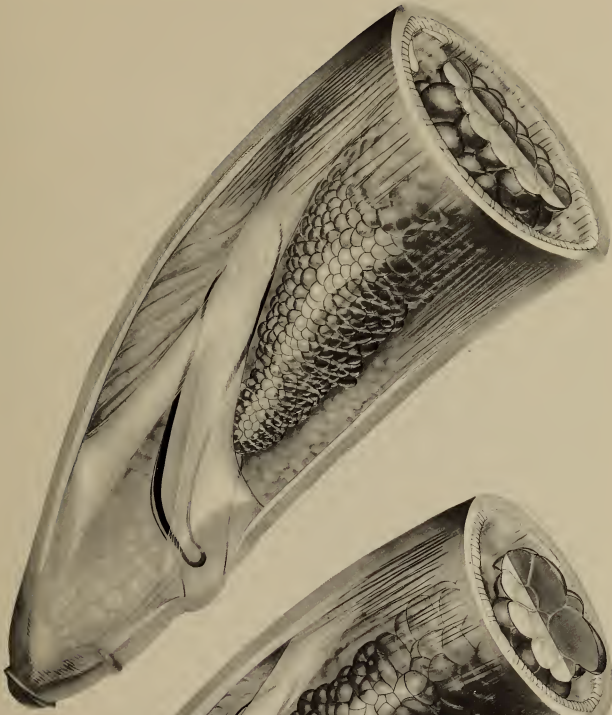




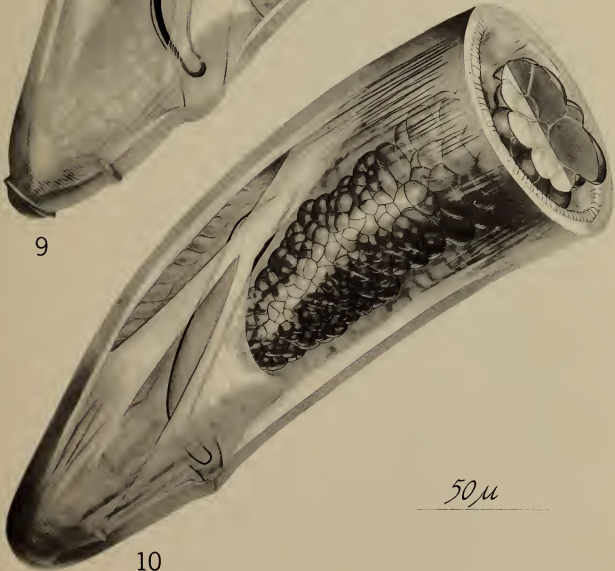
8

25 μ

7



9



10

50μ

1 μ long (Fig. 4). Body cavity occupied posteriorly by solid, cylindrical mass of large cells with very granular cytoplasm (Figs. 5, 9 and 10). Posterior end of cylinder continuous with tube ventral to spiculum; tube comprised of small cells and tapered toward posterior end; possibly continuous with proctodaeum (Figs. 9 and 10).

Single spiculum present (Fig. 6), distally arched ventrad and 72.6 μ –147.3 μ (120.4 $\mu \pm 16.0 \mu$) long. Gubernaculum and copulatory supplements absent (Fig. 9).

Cuticle thickened near mid-tail forming narrow, ventral, transverse ridge, each lateral end of ridge frequently bearing single minute pore. Cuticle at terminus of tail thickened, cap-like (Fig. 9). Caudal glands and spinneret absent. Tail length 61.1 μ –84.2 μ (72.0 $\mu \pm 5.9 \mu$).

Fourth stage juvenile males closely resembling adult but stoma more evident than in male (apparently a narrow tube). Amphid and spiculum less cuticularized. Tail bluntly conical, devoid of ventral ridge and terminal cap, but inner surface of cuticle on ventral side of tail with depression where transverse ridge of adult male tail will form (Fig. 10). Contents of body cavity resembling those of adult. Other juvenile stages and females not known.

Holotype: United States National Museum Number 39215.

Paratypes: United States National Museum Number 39216–39235.

Type locality: East of the New Jersey Coast (39° 46.5' N; 70° 43.3' W) at depths of 1,330 to 1,470 meters.

Distribution: Specimens, at present judged to be of the same species, occurred at the locations given in the table below.

Discussion: The large size and unusual structure of the amphid, vestigial nature of the stoma, apparent absence of a functional esophagus and gut and the presence of a single spiculum in the male of the above described species leave little doubt that these specimens represent not only a new genus and species, but a new family as well. On the other hand, the uniqueness of these features leave some question as to where this family should be placed in the present classification of marine nematodes.

The structure of the amphid of the adult male would suggest that it belongs to the class Enoplida, since it is a pouch-like intracuticular cavity. From the amphids found in members of the families Leptosomatidae, Enoplidae and Oncholaimidae it differs in not having a transverse, external, slit-like opening at its anterior end. The narrow, oval shape of the amphid superficially resembles that found in *Halalaimus*, but the significance of this similarity is difficult to judge since it is not known whether the amphid of *Halalaimus* is an open or a closed cavity.

The smooth, but finely striated cuticle, and the arrangement and number of cephalic setae are also compatible with the structure of the cuticle and arrangement of cephalic setae in Enoplida, however, these characters do not exclude this family from other major taxa of marine nematodes.

Atlantis II Station
(Woods Hole Oceanographic Institute)

Date	Coordinates	Depth	Number of specimens
April 18, 1960	32° 16.6' N; 64° 36.3' W	1700 M	2 ♂ ♂ *
May 2, 1960	32° 17' N; 64° 35' W	1700 M	4 ♂ ♂ *
September 1, 1961	32° 14.3' N; 64° 42' W	1500 M	1 ♂; 2 JUV. ♂ ♂ *
September 4, 1961	32° 15' N; 64° 32.6' W	2500 M	1 JUV. ♂ *
August 25, 1964	39° 46.5' N; 70° 43.3' W	1330-1470 M	18 ♂ ♂; 2 JUV. ♂ ♂ ET

VEMA Stations
(Lamont Geophysical Observatory)

April 4, 1958	34° 35.5' S; 17° 31' E	1860 M	2 ♂ ♂; 1 JUV. ♂
November 1, 1958	27° 17' N; 77° 08' W	1316 M	1 ♂
November 15, 1958	4° 25' N; 78° 25' W	3859 M	1 ♂
March 23, 1961	43° 14' S; 75° 27' W	*	1 ♂

SBT = standard benthic trawl

ET = epibenthic trawl

* = no data available

The presence of a single spiculum, in itself, does not provide a clue to the taxonomic position of this species, since this condition is extremely unusual among free-living nematodes.

There are no organs in the body cavity of our specimens readily recognizable as gut or gonad. That portion of the body cavity usually occupied by these organs contains two contiguous zones. The anterior and longer one is an aggregate of basophilic rods resembling bacteria. If these are bacteria, they possibly are symbionts since they occur in all the specimens at hand, representing a wide geographic area, and they are within the body cavity rather than in the lumen of the gut, suggesting the possibility of a highly evolved biological relationship.

The posterior zone is comprised of a compact cylinder of cells, probably sperm, having continuity with a duct or vas deferens which opens to the exterior of the body near the distal end of the retracted spiculum.

The juvenile males differ from the adult males in having a less cuticularized spiculum. Amphids resembling those of the adults are present in the juveniles, but they also are less cuticularized and appear to be located in the newly developing inner layer of cuticle. Structures that could be interpreted as amphids in the outer layer of the cuticle formed by the preceding juvenile stage were not seen. Perhaps the amphids of the earlier stages are small pores and difficult to resolve.

The change that takes place in the shape of the tail, and the possibility of a change in the structure of the amphid during development, suggest that younger juveniles may possess certain morphological features that would provide a clue to the phylogenetic relationships of this species. Additional clues of relationships may be found in the structure of the females which, if present in the same collections as the males, must be strikingly different due to sexual dimorphism, as in the *Symplocostomatinae*.

LITERATURE CITED

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